PROGRAM

FIFTY FORTH ANNUAL MEETING

OF

THE ROCKY MOUNTAIN NEUROSURGICAL SOCIETY, LLC

American Association of Neurological Surgeons

Jointly Provided by the AANS

Honored Guests:

Dr. Michael Lawton, MD

Dr. Juan Uribe, MD

June 15-19th, 2019

Purgatory Resort

Durango, Colorado

THE ROCKY MOUNTAIN NEUROSURGICAL SOCIETY, INC.

www.rmns.org

Founded 30 April, 1966, in Denver, Colorado
Incorporated 1974 in Houston, Texas

Officers and Executive Committee 2018-2019

President:	Kris Smith, MD
President Elect:	Michael Seiff, MD
Vice President:	Bryan Wohlfeld, MD
Secretary:	Joseph Sramek, MD
Treasurer:	Erik Parker, MD
Historian:	Albert H. Capanna, MD
Past President:	Brett Dietze, MD
Member at Large:	Justin Davis, MD

Committees 2017-2018

Scientific Program Committee:	John Clough, MD
CME Chairman:	Mark Mahan, MD
Local Arrangements:	Brad Duhon, MD Erik Parker, MD
Nominating Committee:	Richard Day, MD (2019) Kelly Schmidt, MD (2020) Brett Dietze, MD (2021)
Membership Committee:	Kelly Schmidt, MD Joseph Sramek, MD Richard Day, MD
Website Administrator:	Joel D. MacDonald, MD
New Members:	Benjamin Rubin, MD Bradley Lega, MD

MEETING AT A GLANCE

SATURDAY, JUNE 15, 2019

1:00-5:00 p.m.	**Registration**
1:00-4:00 p.m.	**Executive Committee Meeting**
6:00 - 9:00 p.m.	**Opening Reception and Kid's Party**

SUNDAY, JUNE 16, 2019

7:30 a.m. - 12:00 p.m.	**Silverton Rail Train Ride**
12:00 - 1:00 p.m.	**Lunch Presentation - Jack Turner Grand Imperial Hotel in Silverton**
3:00 - 5:00 p.m.	**Afternoon Scientific Session - Durango Mountain Institute**

MONDAY, JUNE 17, 2019

7:00 - 7:30 a.m.	**Physician Breakfast**
7:00 - 9:00 a.m.	**Spouse and Children's Breakfast**
7:30 - 12:00p.m.	**Scientific Session**
1:00 p.m.	**Golf Tournament (Glacier Golf Resort)**
6:00 p.m.	**President's Dinner (executive board and guest speakers)**

TUESDAY, JUNE 18, 2019

6:30 a.m.	**Physician Breakfast**
7:00 - 9:00 a.m.	**Spouse and Children's Breakfast**
7:00 - 7:30 a.m.	**Annual Business Meeting**
7:30 a.m 12:00 p.m.	**Scientific Session**
1:00 p.m.	**Tennis Tournament (Glacier Golf Resort)**
6:00 - 9:00 p.m.	**Annual Award Banquet and Dance Kids' Party**

WEDNESDAY, JUNE 19, 2019

7:00- 7:30 a.m.	**Physician Breakfast**
7:00 -9:00 a.m.	**Spouse and Children's Breakfast**
7:30 -12:00 p.m.	**Scientific Session**
12:00 p.m.	**Meeting Adjournment**

Resident Award

First place award for the best resident paper presented at the meeting now includes a $750 cash award. There will also be awards for second place ($500) and third place ($250) resident papers. Each of the first 10 residents to register will receive $500 travel reimbursement.

Academy Cup

Best paper from a practicing neurosurgeon (Active or Associate member).

Raffle

This year we will hold the annual raffle to encourage visitation to the vendor exhibits**.** To enter the raffle you must submit your completed entry card by 12:00 Noon, Tuesday, June 18, 2019. Entry completion requires an exhibitor sign off from each booth.

Purgatory Resort
#1 Skier Place
Durango, Colorado
1-800-525-0892

The 2019 Rocky Mountain Neurosurgical Society Meeting will be held from June 15th through June 19th at The Purgatory Resort, near Durango, Colorado. Dr. Brad Duhon and Dr. Erik Parker are serving as the local arrangements chairmen, and are putting together an exciting array of activities for members, guests, and their families.

The venue for the 54th annual meeting is located at the Purgatory Resort which is about 20 miles north of Durango, Colorado. This wonderful resort promises to offer the usual relaxing yet fun-filled experience that our membership and their families have come to expect. The usual robust scientific program will take place during the mornings, with the after-noons open to participate in one of our planned activities, or just relax and enjoy spending time with family or reconnecting with old friends. Social activities include a trip on the Durango & Silverton narrow gauge railroad , our annual golf and tennis tournaments, and the closing night awards banquet and dance!

Durango is located in Southwestern Colorado at an elevation of 6500 feet. While Durango is a small town, it is well known for its access to many outdoor activities. Purgatory Resort is a ski resort in the winter and has numerous summer activities including an alpine slide, mountain coaster, mountain biking and zip lining! The surrounding area is in the San Juan range with access to hiking, jeeping, fly fishing, river rafting and numerous other activities!

Social Highlights - All attendees, including exhibitors, are invited to our social program
Opening Reception –6:00-9:00 p.m. - *Durango Mountain Institute* - **Saturday**
Silverton Rail Train Ride - 7:30 a.m. - 12:00 - Durango Train Station - **Sunday**
Golf Tournament-1:00 p.m. - Glacier Golf Resort **- Monday**
President's Dinner– 6:30 –9:30 p.m. - Eolus Restaurant, Durango **- Monday***
Tennis Tournament –1:00 p.m. -Glacier Golf Resort **-Tuesday**
Annual Banquet- 6:00-9:00 p.m. - *Dante's at Purgatory* -**Tuesday**

Enjoy dinner, dancing, with awards and prizes for outstanding categories in our Golf and Tennis tournaments.

* ***Transportation is provided for all off site venues***

Dr. Michael Lawton

Michael Lawton, MD, is the President and CEO of Barrow Neurological Institute and the Chair of the Department of Neurosurgery. He is board certified by the American Board of Neurological Surgery.

Dr. Lawton's neurosurgical expertise includes cerebrovascular disorders (aneurysms, arteriovenous malformations, cavernous malformations, and stroke) and skull base tumors. He has experience in treating more than 4,000 brain aneurysms, 800 AVMs, and 1,000 cavernous malformations. He is a member of the American Association of Neurological Surgeons, Congress of Neurological Surgeons, Society of Neurological Surgeons, American Academy of Neurological Surgery, and World Academy of Neurological Surgery.

Dr. Lawton received a degree in biomedical engineering from Brown University and his medical degree from Johns Hopkins University School of Medicine. He completed his neurosurgery residency at Barrow, where he also completed a fellowship in cerebrovascular and skull base surgery. After joining the faculty at University of California, San Francisco, he later completed a fellowship in endovascular surgery there.

Dr. Lawton's research studies the formation, underlying genetics, and rupture of brain AVMs, as well as the hemodynamics, rupture, and computational modeling of brain aneurysms. His clinical research studies the anatomy of microsurgical approaches and clinical outcomes of microsurgery for aneurysms, AVMs, and bypass surgery. He is the principal investigator for the Brain Vascular Malformation Consortium, a NIH-funded multicenter group studying the genetics and clinical course of rare vascular diseases of the brain. He has published over 450 peer-reviewed articles, three single-author textbooks, and over 70 book chapters. He co-founded Mission:BRAIN, a teaching mission to raise the level of neurosurgery practiced in developing countries that conducts annual missions in Mexico and Asia.

Dr. Juan Uribe

Juan Uribe, MD, is chief of the division of spinal disorders, Volker Sonntag chair of spine research, and vice chairman of neurosurgery at Barrow Neurological Institute. He is board certified by the American Board of Neurological Surgery.

Dr. Uribe's expertise includes the surgical treatment of scoliosis, spinal trauma, and spinal tumors, particularly with minimally invasive techniques. He is a member of the American Association of Neurological Surgeons, Congress of Neurological Surgeons, North American Spine Society, Society for Minimally Invasive Spine Surgery, Society of Lateral Access Surgery, and Scoliosis Research Society.

Dr. Uribe earned his medical degree from Instituto Superior de Ciencias de la Salud in Colombia, where he also completed a residency in neurosurgery at Hospital San Vicente de Paul. He also completed a neurosurgery residency at the University of South Florida and a spine surgery fellowship at the University of Miami.

His research interests include anatomical, biomechanical, and clinical studies of applying minimally invasive spine surgery to complex degenerative disease, traumatic injuries, and tumors.

Learning Objectives

Upon Completion of this program, participants should be able to:

1. Evaluate the low risk of EVD infection with a standardized protocol
2. Assess changing nationwide trends in CEA and CAS
3. Compare the outcomes of fusion and decompression in the treatment of patients with spondylolisthesis
4. Support the value of intellectual property protection as an incentive for resident-driven innovation in a neurosurgical education program
5. Compare how demineralized bone matrix products may be a valid alternative to other bone graft adjuncts or biologics on the market.
6. Identify the risks and theoretical benefits of preoperative embolization for WHO grad 1 meningiomas
7. Identify predictors of readmission following anterior cervical spine surgery

SCIENTIFIC PROGRAM - JUNE 15th– 19th

Rocky Mountain Neurosurgical Society

54th Annual Meeting

Purgatory Resort, Durango, CO

SUNDAY JUNE 16th, 2019

15:30-18:30	**SCIENTIFIC SESSION I:** **Moderator: John Clough, MD**
15:30-15:50	**Introductory Remarks and Welcome to Durango President Kris Smith, MD** *Vendors Welcome*
15:50-16:10	**Chad Tuchek, MD** ****** Novel Imaging Techniques of Intramedullary Spinal Cord Tumors for Preoperative and Intraoperative Assessment
16:10-16:30	**Chad Tuchek, MD** ****** Pituitary Apoplexy: A Meta-Analysis of Surgical and Medical Management Long Term Outcomes
16:30-16:50	**Jessa E. Hoffman, MD** ****** Successful Treatment of Brainstem Cavernous Malformation with Hematoma Evacuation Followed by Propranolol
16:50-17:10	**Brandon Sherrod, MD** ****** Dysphagia and Quality of Life Outcomes Following Anterior Cervical Fusion
17:10-17:30	**Jian Guan, MD** ****** Addition of Fusion to Decompression for Grade I Degenerative Lumbar Spondylolisthesis is Associated With Greater Patient-Reported Outcome Improvements at 24-Month Follow-up: A Multicenter Study Using the Quality Outcomes Database
17:30-18:30	**SPECIAL GUEST LECTURE – Michael Lawton, MD** **President, CEO and Chief at Barrow Neurological Institute** **Phoenix, Arizona** Surgical Management of Brain AVMs
	ANNOUNCEMENTS & ADJOURN

**** Resident Award Candidate**

MONDAY JUNE 17th, 2019

07:00-07:55	**Breakfast**
08:00-12:15 **MODERATOR:**	**SCIENTIFIC SESSION II:** **Justin Davis, MD**
08:00-09:00	**SPECIAL GUEST LECTURE – Juan Uribe, MD** **Chief of Spinal Disorders, Sonntag Chair of Spine Research, Neurosurgery Vice Chair Barrow Neurological Institute, Phoenix, Arizona** MIS Deformity When and How
09:00-10:00	**SPECIAL GUEST LECTURE – Ken Finn, MD** **President and Founder of Springs Rehabilitation Colorado Springs, Colorado** Basic Science of the Endocannabinoid System and Review of Medical Literature as it Relates to the Use of Marijuana for Pain
10:00-10:15	**Break**
10:15-11:15	**SPECIAL GUEST LECTURE – Juan Uribe, MD** MIS Trauma Applications
11:15-12:15	**SPECIAL GUEST LECTURE – Michael Lawton, MD** Bypass Surgery for Complex Brain Aneurysms
12:15	**ANNOUNCEMENTS & ADJOURN**

TUESDAY JUNE 18th, 2019

07:00-07:55	**Breakfast**
07:30-07:55	**ANNUAL BUSINESS MEETING FOR ALL RMNS MEMBERS**
08:00-12:00	**SCIENTIFIC SESSION III:**
MODERATOR:	**Joel Macdonald, MD**
08:00-08:10	**Introduction to RMNS 55th Annual Meeting in Coeur d'Alene, Idaho** **Brad Duhon, MD**
08:10-08:30	**Robert Kim, MD** ** Any-Cause Prolonged Length of Stay (pLOS) is Associated with Increased Risk of Unplanned 30-Day Readmission in Elective Spine Surgery Patients: Propensity Score-Matched Analysis of 33,840 Patients
08:30-09:30	**Steven Ottersberg, MS** Pharmacology and Pharmacogenomics of Cannabis Therapies
09:30-10:00	**BREAK** **
10:00-10:20	**Clinton Morgan, MD** Barrow Innovation Center: A Novel Program in Neurosurgical Education
10:20-10:40	**Joshua Catapano, MD** ** The Results of a Standardized Ventriculostomy Protocol without an Occlusive Dressing in Patients with Aneurysmal Subarachnoid Hemorrhage
10:40-11:00	**Vin Shen Ban, MD** The Southwestern Aneurysm Severity Index for Unruptured Aneurysms
11:00-12:00	**SPECIAL GUEST LECTURE – Nasha Winters, ND, FABNO** (families welcome) ** Implementing a Therapeutic Ketogenic Diet to Enhance Patient Outcomes
12:00	**ANNOUNCEMENTS & ADJOURN**

**** Resident Award Candidate**

WEDNESDAY JUNE 19th, 2019

07:00-07:55	**Breakfast**
08:00-10:30 **MODERATOR:**	**SCIENTIFIC SESSION IV** **Brad Duhon, MD**
08:00-08:20	**Douglas Orndorff, MD** Lateral Lumbar Interbody Fusion as a Treatment for Adult Degenerative Scoliosis: Survival Analysis
08:20-08:40	**Douglas Orndorff, MD** Efficacy of Demineralized Bone Matrix for Instrumented Combined Posterolateral Interbody Lumbar Fusion
08:40-09:00	**Bradley Lega, MD** Theodore Billroth and the Origins of Modern Surgical Practice
09:00-10:00	**Kris Smith, MD** Keto Update: Multiple Documented Radiographic Responders to Nutritional Ketosis Added to Standard Therapies
10:00-10:30	**CLOSING REMARKS AND MEETING ADJOURN** **Kris Smith, MD**

Vendor Participants

This year we have the pleasure of welcoming the following exhibitors to the Rocky Mountain Neurosurgical Society's Annual Meeting. Please stop by their booths to thank your representatives for their company's support.

*Visit each booth and qualify to win a **Apple AirPods!***

Globus

Medtronic

Orthofix

Sea Spine

Kls martin

Renovis

Wenzel spine

Paradigm

Spine wave

Stryker K2M

SI bone

Southwest Surgical

Olympus

SMR Medical

Assure Neuromonitoring

Isto Biologics

CTL Amedica

Joimax

Integra Codman Specialty Surgical

Disclosure Information

The AANS and The RMNS control the content and production of this CME activity and attempt to ensure the presentation of balanced, objective information. In accordance with the Standards for Commercial Support established by the Accreditation Council for Continuing Medical Education (ACCME), faculty, abstract reviews, paper presenters/authors, planning committee members, staff and others involved in the planning of the educational content and the significant others of those mentioned must disclose any relationship they or their co-authors have with commercial interests which may be related to their content. The ACCME defines "relevant financial relationships" as financial relationships in any amount occurring within the past 12 months that create a conflict of interest.

Those who have disclosed a relationship* with commercial interests are listed below:

Name	Disclosure	Type of relationship*
Albert Capanna, MD**	KLS Martin	Honorarium
Brad Duhon, MD**	SI - Bone, INC	Consultant
Mark Mahan, MD**	Boston Scientific Providence Medical Joimax AxoGen Gecko Biomedical	Consultant

*Relationship refers to receipt of royalties, consultantship, funding by research grants, receiving honoraria for educational services elsewhere, or any other relationship to a commercial interest that provides sufficient reason for disclosure.

Those who have reported that they do not have any relationships with commercial interests:

Vin Shen Ben, MD

Joshua Catapano, MD

John Clough, MD **

Justin Davis, MD **

Ken Finn, MD

Jian Guan, MD

Jessa Hoffman, MD

Robert Kim, MD

Bradley Lega, MD

Joel MacDonald, MD **

Clinton Morgan, MD

Douglas Orndorff, MD

Steven Ottersberg, MD

Erik Parker, MD **

Michael Seiff, MD **

Brandon Sherrod, MD

Joseph Sramek, MD **

Chad Tuchek, MD

Allison Whipple **

Bryan Wohlfeld, MD **

** Educational content planner of this meeting

Accreditation Statement and Designation Statement

This activity has been planned and implemented in accordance with the accreditation requirements and policies of the Accreditation Council for Continuing Medical Education (AACME) through the joint providership of the AANS and the Rocky Mountain Neurosurgical Society. The AANS is accredited by the ACCME to provide continuing medical education for physicians.

The AANS designates this live activity for a maximum of 13 *AMA PRA Category 1 Credits*TM. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Joint Providership Disclaimer

The material presented at the 54th Annual Rocky Mountain Neurosurgical Society Meeting has been made available by the Rocky Mountain Neurosurgical Society and the AANS for educational purposes only. The material is not intended to represent the only, nor necessarily the best, method or procedure appropriate for the medical situations discussed, but rather it is intended to present an approach, view, statement, or opinion of the faculty, which may be helpful to others who face similar situations.

Neither the content (whether written or oral) of any course, seminar or other presentation in the program, nor the use of specific product in conjunction therewith, nor the exhibition of any materials by any parties coincident with the program, should be construed as indicating endorsement or approval of the views presented, the products used, or the materials exhibited by the Rocky Mountain Neurosurgical Society and jointly provided by the AANS, or its Committees, Commissions, or Affiliates.

Neither the AANS nor the Annual Rocky Mountain Neurosurgical Society makes any statements, representations or warranties (whether written or oral) regarding the Food and Drug Administration (FDA) status of any product used or referred to in conjunction with any course, seminar or other presentation being made available as part of the 54th Annual Rocky Mountain Neurosurgical Society Meeting. Faculty members shall have sole responsibility to inform attendees of the FDA status of each product that is used in conjunction with any course, seminar or presentation and whether such use of the product is in compliance with FDA regulations.

Historical Notes

Eight neurological surgeons from the Rocky Mountain States met informally in Denver, CO on April 30, 1966, and a Founders meeting was held which established The Rocky Mountain Neurosurgical Society.

Harry Boyd, MD	Denver, CO
Thomas Craigmile, MD	Denver, CO
Charles Elkins, MD	Tucson, AZ
Robert Imler, MD	Tulsa, OK
Alexander Johnson, MD	Great Falls, MT
Homer McClintock	Denver, CO
Chester Powell, MD	Salt Lake City, UT
William McKinney, MD	Fort Worth, TX

Because of the growth and complexity of the society in which we now live, Articles of Incorporation were approved in December 1974, in the State of Texas as a non-profit organization and The Rocky Mountain Neurosurgical Society, Inc. was established and obtained a tax exempt status.

RMNS Constitution - Revised June 1999

Article I - Name
The organization shall be known as The Rocky Mountain Neurosurgical Society, Inc.

Article II - Purpose
The corporation is organized for exclusively educational and other charitable purposes, and is a nonprofit corporation and the period of its duration is perpetual. The purpose of the Society shall be (1) to promote knowledge within the fields of neurological surgery and allied branches of medicine. It shall be within the purposes of the corporation to use any means to such end as may from time to time seem expedient to its members or trustees, including study, investigation, research, publication, publicity, instruction, the organization of educational or other charitable activities, agencies and institutions and the aid of any such educational or other charitable activities, agencies and institutions already established; (2) the promotion of fellowship and the exchange of ideas among its members.

Article III - Membership
Section 1 - The membership of Society shall consist of five categories: ACTIVE, ASSOCIATE, SENIOR, INACTIVE, and HONORARY.
(A) ACTIVE MEMBERS shall consist of neurological surgeons who have been certified by the American or Mexican Board of Neurological Surgery, or Fellowship in the Royal College of Surgeons (Canada), and also members of allied fields who have been certified by their appropriate board in that allied specialty. Active members in allied fields shall not exceed twenty per cent (20%) of the total membership of the Society.

(B) ASSOCIATE MEMBERS will include physicians and doctors of philosophy qualifying in one of the following categories:

1) Neurological surgeons living in the geographic confines of the Society who have completed their training and have met all the requirement for Board Certification but who have not been certified by the American or Mexican Board of Neurological Surgery, or Fellowship in the Royal College of Surgeons (Canada). Following certification an Associate Member shall become eligible for Active Membership and may apply to the Membership Committee for change in classification.

2) Neurological surgeons who have an outstanding record in the field over a period of years due to high standard and quality of work.

3) Members in the Neurosciences who have had acceptable academic training equivalent to the requirements for board certification in that field.

(C) SENIOR MEMBERSHIP shall be accorded to those members over the age of sixty who have been active dues-paying members for ten (10) years or greater. Senior members will be relieved of the payment of dues and rules of attendance. They may not hold office but will retain all other privileges of membership.

(D) INACTIVE MEMBERSHIP shall be accorded to members who no longer practice in the geographic domain of the Society or members who are physically disabled or retired from practice. Inactive members shall be relieved of payment of dues. They may attend meetings of the Society but shall not vote or hold office.

(E) HONORARY MEMBERS shall be chosen from recognized leaders in the field of neurological surgery and allied fields who are neither active nor associate members. They shall not be required to pay initiation fees or dues and shall enjoy all of the privileges of active membership except those of voting or holding office. There shall be no limitation on their selection.

Section 2- Membership, except for Honorary and Inactive Members, shall consist of those physicians residing in Alaska, Arizona, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, Utah, Wyoming, adjacent provinces of Canada, and The Republic of Mexico.

Article IV Founders Group - Executive Committee

The Founders Group shall act as an Executive Committee until the time of the First Annual Meeting. They will assume all the duties of the Executive Committee, including those of the Nominating Committee, the Program Committee, and any other duties being deemed necessary. This committee will submit a nomination slate, which will be voted upon by all the Active Members. This committee has the power to accept as members of the Society any that they feel meet the requirements as outlined by the By-Laws. The power is given to the committee until the First Annual Meeting, after which time all membership applications will be acted upon as outlined in the By-Laws.

Article V - Officers

Section 1 - The officers of the Society shall consist of a President, President-Elect, Vice-President, Secretary, Treasurer and Historian. The President and Vice-President shall be elected for a period of one year and neither may succeed himself. The President-Elect shall succeed to the office of President one year following his election. The Secretary and Treasurer shall be elected for a period of three years and the Historian shall be elected for a period of five years.

Section 2 - The Executive Committee (9) shall be comprised of the President, Immediate Past-President, the President-Elect, Vice-President, Secretary, Treasurer, Historian and one Member-at-Large appointed by the President and a Continuing Medical Education (CME) liaison also ap-

pointed by the President.

Article VI - Duties of Officers

Section 1 - The President shall preside at all meetings of the Society and of the Executive Committee. He shall appoint all committees. He shall cast the deciding vote in any ties resulting from balloting of the members of the Society.

Section 2 - The Vice-President shall preside in the absence of the President and be the Society Parliamentarian.

Section 3 - The Secretary shall record the proceedings and attendance of each meeting and shall report this record at the succeeding meetings. He shall collect an preserve all records, including the membership roll, and shall forward to the Historian all paper which are of documentary or historical value to the Society. He shall send notice to the membership of all meetings two months in advance, and shall notify all members of appointments and assigned duties. He shall carry on all other correspondence and business essential for the proper function of the Society. The Secretary shall forward to the Membership Committee all completed applications for membership within three months prior to the date of the Annual Meeting.

Section 4 - The Treasurer shall collect the dues and assessments and carry out the fiscal transactions of the Society. The Treasurer shall keep an accurate record of these transactions and render an annual report. The Treasurer shall submit records annually to a certified public accountant for report to the President. The Treasurer shall notify all members who are delinquent in payment of dues or assessments.

Section 5 - The Historian shall compile and retain all pertinent data relative to the founding, programs and functioning of the Society.

Section 6 - The Executive Committee shall have general supervision over the affairs of the Society. They shall:

(A) Make recommendations as to the time and place of the Annual Meeting.

(B) Review all applications from the Membership Committee and make their recommendations at the Annual Meeting.

(C) Have the power of decision in the consideration of each candidate's personal and professional qualifications.

(D) Upon request make a careful investigation as to a candidate's personal and professional qualifications.

(E) Call special meetings when deemed necessary.

(F) Invite official guests and, in consideration with the host for said meeting, limit their number.

(G) Review all matters concerning fiscal delinquency and absence of members and make appropriate recommendations to the Society regarding these matters.

Article VII - The Constitution

The Constitution shall be in effect from the time of its adoption. It shall be amended only by written resolution at an annual Meeting. Such resolutions must be circularized to the membership by the Secretary two months before the Annual Meeting at which time a vote will be taken. Approval by three-fourths of the voting members present will be necessary for acceptance.

RMNS By-Laws - Revised June 1999

Article I - Application and Election to Membership

Section 1 - The President shall appoint a Membership Committee of three members whose duties shall be to review all applications for membership and to conduct careful investigations as to per-

sonal and professional qualifications of all applicants. The recommendations of this Committee shall be presented to the Executive Committee at the Annual Meeting.

Section 2 - Every candidate for active, associate, senior, inactive or honorary membership shall be proposed by at least two active, associate or senior members of the Society on the required application form furnished by the Society. Appropriately completed membership applications shall be in the hands of the Secretary at least four months before the date of the Annual Meeting. Two months before the Annual Meeting the Secretary shall send to each member of the Society a list of all candidates for membership. Members are urged to submit to the Executive Committee written comments on the candidate's qualifications for membership.

Section 3 - The Executive Committee shall have power of decision in the consideration of each candidate's eligibility and its judgment upon each eligibility shall be final. No candidate for membership shall be voted upon at the Executive Session of the Society unless recommended by the Executive Committee.

Section 4 - Election to the membership shall be at the Executive Session of each Annual Meeting and if three-fourths of the votes are favorable, the candidate shall be declared elected.

Section 5 -The names of all candidates who have not been recommended for membership by the Executive Committee three years after nomination shall be withdrawn and their sponsor notified. A subsequent application of such candidate can be made after a period of two years. Any candidate for membership who has been recommended by the Executive Committee but not elected by the Society cannot be proposed again for a period of two years.

Section 6 - Any Active or Senior member in good-standing may prefer charges alleging that a member is failing to maintain good professional conduct. Such charges may be made against any class of member. All charges shall be in writing and shall specify the basis thereof. These charges shall be delivered to the Secretary who shall immediately forward a copy to the accused, by registered mail sent to his last known address, a copy to the Executive Committee, and retain the original copy. The Executive Committee shall investigate the charges and shall call on the members who file the charges for such information, witnesses, evidence etc. as may be necessary for a full investigation. Both the accused and accuser or accusers shall be given a full hearing by the Executive Committee at its next regularly scheduled meeting. The accused may conduct his own defense or shall be entitled to counsel of his own selection, but counsel for the accused shall also be allowed to secure, at the Society's expense, through the use of a competent stenographer, a verbatim report of the hearing of his case by the Executive Committee in the absence of the accused at the hearing, unless he expressly waives participation therein, the Presiding Officer shall appoint a member to represent him and the hearing shall proceed as though he were present. The hearing shall be closed to all except members of the Society and the counselors chosen for the purpose of this hearing.

Provided the investigation is satisfactorily completed and the accused has been given a hearing, if he so desires, the Executive Committee shall within ten days of the completion of the hearing, determine:

(A) That the charges are not sustained, and that no further action be taken; or

(B) That the charges are sustained and that the accused be:

1) censured, or

2) suspended for a definite time, or

3) expelled from the society.

The accused shall be notified by the President in writing, by registered mail sent to his last known address, the date of the meeting in which the recommendation of the Executive Committee will be made. At that meeting the accused shall be given an opportunity to make any statement that he desires before action is taken on the recommendations of the Executive Committee. The President

may also make a statement and explain and define findings of the Executive Committee, but there shall be no examination of witnesses or introduction of further evidence before the Executive Committee. Censure or supervision shall require an affirmative vote of at least 2/3 of the voting members of the Executive Committee present. Expulsion shall require an affirmative vote of at least 3/4 of the voting members of the Executive Committee. Any members of this Society who may feel aggrieved by the action of the Executive Committee in censuring, suspending, or expelling him shall have the right to appeal to the entire membership at the time of the next annual meeting. At this time, the accused shall be given the opportunity to make any statements he desires and may have counsel present if he so desires. The President of the Rocky Mountain Neurosurgical Society may also make a statement and explain and define the findings of the Executive Committee, but here shall be no examination of witnesses or introduction of further evidence before the membership. At the conclusion of the meeting, the Membership shall, by secret ballot, determine whether it will sustain or change the action of the Executive Committee. An affirmative vote of at least a majority of the voting members present shall sustain or change the action of the Executive committee.

Article II - Election of Officers

Section 1 - The officers of the Society shall be elected from the Active Membership at each Annual Meeting and shall take office at the close of that meeting. The President shall not be eligible for re-election at any time. The Vice-President, as well, may not be re-elected to the Vice-Presidency but may be eligible for any other office in the Society. The nominating committee shall notify the membership of a proposed slate of officers before the Annual Meeting. Additional nominations may be made from the floor. The election shall be by ballot and the member receiving the greatest number of votes shall be declared elected to the office for which he was a candidate.

Section 2 - In the case of a vacancy in an office, it shall be filled by appointment by the Executive Committee.

Article III - Initiation Fees and Dues

Section 1 - Every Active and Associate Member on his election to membership shall pay an initiation fee of twenty-five dollars ($25.00) by which act he acknowledges and accepts the Constitution and By-Laws. Honorary members shall not pay an initiation fee.

Section 2 - Every Active and Associate member shall pay annual dues. The amount of the dues shall be determined by the vote of the Executive Committee, so as to maintain the Society in a financially stable condition. Payment of dues shall be received by January 1 and if unpaid by March 1, shall become delinquent.

Section 3 - Any member in arrears for two years shall be notified by the Treasurer in writing, and if he fails to pay his dues within two months thereafter shall forfeit his membership. It shall be the duty of the Treasurer to notify the Executive Committee of this forfeiture.

Section 4 -The expenses of the Annual Meeting shall be paid principally from funds received as registration fees for that meeting. The amount of the registration fee for each Annual Meeting will be set by the Executive Committee.

Section 5 - The prorated expense of an invited guest shall be borne by his host.

Section 6 - While on temporary duty with the Armed Forces, any Active or Associate Member shall be exempt from paying dues.

Article IV - Guests

Section 1 - Any member may invite a guest to attend the annual meeting. The fees for non-member guests are set by the Executive Committee.

Section 2 - The Executive Committee shall be empowered to select official guests. These shall be local physicians and surgeons at the place of the meeting or especially invited guests to participate in the program.
Section 3 - The prorate share of the officially invited guests will be borne by the Society, and determined/limited at the time of the invitation.
Section 4 - The limitation of the number of guests to attend any given meeting shall be at the discretion of the Executive Committee and the host for said meeting.
Section 5 - Invited guests shall be entitled to all the privileges of the Society during the annual session except attendance at business or Executive Sessions.

Article V - Meetings
Section 1 - The Rocky Mountain Neurosurgical Society, Inc. shall meet annually at such time and place as may be designated by the Executive Committee.
Section 2 - There shall be at least one annual Executive Session of Active Members of the Society at which the order of business shall be as follows:

1. Reading of the minutes of the last meeting.
2. Report of the Secretary.
3. Report of the Treasurer.
4. Report of the Executive Committee.
5. Report of the Historian.
6. Report of the review of the Treasurer's Account
7. Reports of Special Committees.
8. Unfinished Business.
9. New Business.
10. Election of Members.
11. Report of the Nominating Committee.
12. Election of Officers.

Section 3 - Members shall sign the permanent register of the Society as a record of their attendance. A special register shall be provided for guests.
Section 4 - Special meetings of the Society may be called on the advice of the Executive Committee. Every member shall be notified of the place and time of the meeting at least two weeks in advance.

Article VI - Quorum
Only Active Members shall attend any Business Session and shall constitute a quorum for business.
Article VII Parliamentary Authority
“Robert’s Rules of Order - Revised Edition” shall be parliamentary authority in all matters not specified by the Constitution or By-Laws.

Article VIII - Committees
Section 1- The President shall appoint with the approval of the Executive Committee, the following committees:
(A) Program Committee, of which the Secretary is a member ex officio;
(B) Committee on Arrangements for the Annual Meeting;
(C) Membership Committee, consisting of three members;
(D) Nominating Committee, consisting of the immediate three Past Presidents.
Section 2 - The President shall appoint such other committees as indicated.

Article IX - Forfeiture of Membership
Membership may be forfeited for reasons deemed sufficient by the Society, which may be effected by a three-fourths majority vote.

Article X - Scientific Papers

Section 1 - An abstract of all papers to be read must be submitted to the Program Committee three months before the meeting, excluding those presented by invited guests of the Society. The Committee shall exercise the right of accepting or rejecting papers.

Section 2 -The time allotted for the presentation and discussion of a paper shall be at the discretion of the Program Committee subject to approval of the Executive Committee. A tentative program shall be sent to each member by the Secretary two weeks prior to the stated meeting.

Section 3 - A Resident award paper will be selected for presentation t the Annual Meeting by the Program Committee and an award will be given.

Article XI - Amendments

These By-Laws may be amended at the Annual Meeting by approval of three-fourths of the voting members present, provided due notice of the proposed changes has been given to the membership at least two months before said meeting.

Past Meetings of the Society

1966	Colorado Springs, CO
1967	Tucson, AZ
1968	Banff, AB
1969	McAllen, TX
1970	Sun Valley, ID
1971	Colorado Spirngs, CO
1972	Guadalajara, Mexico
1973	Scottsdale, AZ
1974	Victoria, BC
1975	Cozumel-Merida, Mexico
1976	Las Vegas, NV
1977	Lake Tahoe, NV
1978	Colorado Springs, CO
1979	Jackson Hole, WY
1980	Park City, UT
1981	Durango, CO
1982	Big Sky, MT
1983	Mescalero, NM
1984	Colorado Springs, CO
1985	Banff, AB
1986	Keystone, CO
1987	Deer Valley, UT
1988	Lake Tahoe, NV
1989	Durango, CO
1990	Vail, CO
1991	Jackson Hole, WY
1992	Sedona, AZ
1993	Bigfork, MT
1994	Snowmass, CO
1995	Sun Valley, ID
1996	Telluride, CO
1997	Jasper Park Lodge, AB
1998	Vail, CO
1999	Coeur D'Alene, ID
2000	Alyeska, AK
2001	Steamboat Springs, CO
2002	Santa Ana Pueblo, NM
2003	Big Sky, MT
2004	Squaw Creek, CA
2005	Whistler, BC
2006	Sedona, AZ
2007	Jackson Hole, WY
2008	Park City, UT
2009	Girdwood, AK
2010	Telluride, CO
2011	Taos, NM
2012	Maui, HI
2013	Sun Valley, ID
2014	Victoria, BC
2015	Colorado Springs, CO
2016	Whitefish, MT
2017	Lake Tahoe, CA
2018	Banff, AB

Past Presidents

1966	**Homer G. McClintock**	**Denver, CO**
1967	**Charles Elkins**	**Tucson, AZ**
1968	**William McKinney**	**Ft. Worth, TX**
1969	**Chester Powell**	**Salt Lake City, UT**
1970	**Thomas K. Craigmile**	**Denver, CO**
1971	**Alexander C. Johnson**	**Great Falls, MT**
1972	**Joseph W. Robertson**	**Houston, TX**
1973	**Robert G. Fisher**	**Oklahoma City, OK**
1974	**Michael Pollay**	**Albuquerque, NM**
1975	**Robert L. Imler, Jr.**	**Tulsa, OK**
1976	**Javier Verdura**	**Mexico City, Mexico**
1977	**George T. Hoffman**	**Phoenix, AZ**
1978	**Michael McNally**	**Colorado Springs, CO**
1979	**Richard Moiel**	**Houston, TX**
1980	**R. Barton Carl**	**Oklahoma City, OK**
1981	**Ralph J. Kaplan**	**Oklahoma City, OK**
1982	**Paul Turner**	**Roswell, NM**
1983	**Charles Clough**	**Kansas City, MO**
1984	**Robert Partain, III**	**San Antonio, TX**
1985	**Ronald D. Clark**	**Greeley, CO**
1986	**Richard F. Tenney**	**Tulsa, OK**
1987	**Robert S. Hood**	**Salt Lake City, UT**
1988	**Henry Fieger**	**Denver, CO**
1989	**Franco Erculei**	**Las Vegas, NV**
1990	**Harry B. Tate**	**Oklahoma City, OK**
1991	**David Fell**	**Tulsa, OK**
1992	**Wayne Paullus**	**Amarillo, TX**
1993	**Kenyon Kugler**	**Tulsa, OK**
1994	**Volker Sonntag**	**Phoenix, AZ**
1995	**Lee Krauth**	**Denver, CO**
1996	**Robert Morelli**	**Reno, NV**
1997	**Larry Tice**	**Grand Junction, CO**
1998	**Ronald Apfelbaum**	**Salt Lake City, UT**
1999	**Charles Fullenwider**	**Muskogee, OK**
2000	**Kevin Lillihei**	**Denver, CO**
2001	**Howard Morgan**	**Dallas, TX**
2002	**Al Capanna**	**Las Vegas, NV**
2003	**Vance MacDonald**	**Las Vegas, NV**
2004	**Richard Schmidt**	**Salt Lake City, UT**
2005	**John McVicker**	**Englewood, CO**
2006	**Mary Kay Gumerlock**	**Oklahoma City, OK**
2007	**Robert Beatty**	**Kansas City, KS**
2008	**Joel MacDonald**	**Salt Lake City, UT**
2009	**Jonathan White**	**Dallas, TX**
2010	**Michael Brown**	**Colorado Springs, CO**
2011	**Randy Jensen**	**Salt Lake City, UT**
2012	**Stewart Levy**	**Denver, CO**
2013	**Paul Elliott**	**Denver, CO**
2014	**Paul House**	**Salt Lake, UT**
2015	**Richard Day**	**Missoula, MT**
2016	**Kelly Schmidt**	**Kalispell, MT**
2017	**Brett Dietze**	**Texarkana, TX**
2018	**Kris Smith**	**Phoenix, AZ**

Past Honored Guest Speakers

1966:	**Dr. Dwight Parkinson**
	Dr. Howard Barrows
	Dr. Theodore Kurze
	Dr. Edwin M. Todd
	Dr. Lyle A. French
1967:	**Dr. R. Eustace Semmes**
	Dr. Harold A. Sofield
	Dr. . L. Cashion
	Dr. Merlin K. DuVal
	Dr. Paul M. Lin
	Dr. Mark Kartchner
	Dr. Robert L. Scanlan
1968:	**Dr. Burton Wise**
	Dr. Morley Singer
1969:	**Dr. Philip Dodge**
	Dr. Miguel Ramos-Murgia
1970:	**Dr. Richard Bergland**
	Dr. John C. Stears
	Dr. James Bor
	Dr. Donald Nelson
1971:	**Dr. Thomas Acers**
	Dr. Philip Ellis
	Dr. Henry VanDyk
	Dr. Eugene Wiggs
1972:	**Dr. Temple W. Williams**
	Dr. Robert Barnard Couch
	Dr. Daniel Gonzalez-Gonzalez
1973:	**Dr. Eduardo Eidelberg**
	Dr. Robert E. Flynn
	Dr. John A. Hodak
	Dr. Robert Scanlon
	Dr. James R. Nelson
	Dr. John D. Waggener
1974:	**Dr. Arthur R. Dick**
	Dr. Stanley R. Nelson
1975:	**Dr. Keasley Welch**
	Dr. Ken Winston
	Dr. Russell Snyder
1976:	**Dr. Rubin Bressler**
	Dr. David Norman
	Dr. Charles B. Wilson
1977:	**Dr. John J. Caronna**
	Dr. Joel B. Kirkpatrick
	Dr. David G. Kline
	Dr. Martin H. Weiss
1978:	**Dr. O. Howard Reichman**
	Dr. Clark Millikan
	Dr. Phillip Weinstein
	Dr. Wesley Moore
1979:	**Dr. Patrick J. Kelly**
	Dr. George Ojemann
	Dr. George Prigatano
	Dr. Donald Richardson
1980:	**Dr. Martin Weiss, USC**
	Dr. Theodore Roberts
	Dr. Robert Anderson
	Dr. Richard Worley
	Dr. M. Peter Heilbrun
	Dr. George Sanborn
	Dr. Clifford Snyder
	Dr. Ann Osborn
	Dr. K. C. Wong
1981:	**Dr. William Buchheit**
	Dr. Thomas Carlow
	Dr. John A. Kusske
	Dr. Gail Neeley
	Dr. Robert Segal
	Dr. Earl Walker
1982:	**Dr. James Harp**
	Dr. Richard Hermann
	Dr. John R. Mullan
	Dr. Phanor Perot
1983:	**Dr. Rubin Bressler**
	Dr. Harold Hoffman
	Dr. Ron Lemire
	Dr. Joachim Seeger
1984:	**Dr. Gary G. Ferguson**
	Dr. Madan V. Kulkarni
	Dr. Jim L. Story
	Dr. John M. Tew, Jr.
1985:	**Dr. Ernst Grote**
	Dr. John Loeser
	Dr. James Ogilvie
	Dr. John Robertson
1986:	**Dr. Albert Rhoton**
	Dr. Bryce K. A. Weir
1987:	**Dr. Burton P. Drayer**
	Dr. Patrick J. Kelly
	Dr. David G. McLone
1988:	**Dr. Peter J. Jannetta**
	Dr. H Ric Harnsberger
	Dr. Kalmon D. Post
1989:	**Dr. M. Stephen Mahaley**
	Dr. Robert G. Ojemann
	Dr. John Stears
1990:	**Dr. Charles G. Drake**
	Dr. Sanford J Larson,
	Dr. John Stears
	Dr. Dwight Parkinson
1991:	**Dr. Bennett Stein**
	Dr. Robin Humphreys
	Dr. Daniel J Sexton
1992:	**Dr. L Nick Hopkins**
	Dr. Wolfhard Casper
	Dr. Taka Fukashima

1993:	**Dr. Raj K. Narayan**
	Dr. Donlin M. Long
	Dr. Edward H. Oldfield
1994:	**Dr. Alan Cohen**
	Dr. Stephen Papadopoulous
	Dr. Laligam N. Sekhar
1995:	**Dr. Hunt Batjer**
	Dr. Thomas Brott
	Dr. Thomas Mehalic
1996:	**Dr. Daniel Barrow**
	Dr. Michael Scott
1997:	**Dr. Steve Giannotta**
	Dr. Charles Tator
1998:	**Dr. Richard Morawetz**
	Dr. David Piepgras
1999:	**Dr. Edwards LawS**
	Dr. Regis Haid
2000:	**Dr. Albert Rhoton**
	Dr. Neal Martin
2001:	**Dr. Markin Weiss**
	Dr. J Patrick Johnson
2002:	**Dr. Duke Samson**
	Dr. Edward Benzel
2003:	**Dr. M Gazi Yasargil**
	Dr. Kevin Foley
2004:	**Dr. Arthur Day**
	Dr. Kevin Foley
2005:	**Dr. Kim Burchiel**
	Dr. Alex Valadka
2006:	**Dr. Daniel Resnick**
	Dr. Rayminel Sawaya
2007:	**Dr. Mark Hadley**
	Dr. Michael Bliss
2008:	**Dr. Peter Black**
	Dr. Kim Burchiel
2009:	**Dr. Doug Kondziolka**
	Dr. Neil Kitchen
2010:	**Dr. Lori Shutter**
	Dr. Guy Clifton
2011:	**Dr. Fredirick Boop**
	Dr. Robert Rostomily
2012:	**Dr. Jeff Bruce**
	Dr. Charles Branch
2013:	**Dr. Frederick Lang**
	Dr. Jamie Ullman
2014:	**Dr. James Rutka**
	Dr. M. Sean Grady
2015:	**Dr. Nicholas Barbaro**
	Dr. Randall Chesnut
2016:	**Dr. Richard Ellenbogen**
	Dr. Anthony Asher
2017:	**Dr. James Goodrich**
	Dr. B. Gregory Thompson
2018	**Dr. Hunt Batjer**
	Dr. John Hurlbert
	Dr. William Couldwell

ABSTRACTS

RESIDENT: Chad Tuchek
AUTHORS: Chad Tuchek1, Paul J. Camarata, MD1
RESIDENT AWARD: YES

TITLE: Novel Imaging Techniques of Intramedullary Spinal Cord Tumors for Preoperative and Intraoperative Assessment

ABSTRACT: Magnetic Resonance Imaging is the gold standard for imaging of intramedullary spinal cord lesions. Accurate preoperative diagnosis is often difficult and formal pathologic analysis portends an associated operative morbidity. Novel magnetic resonance imaging techniques combined with updated operative planning software suites are continually providing the surgeon with better preoperative and intraoperative tools for diagnosis and surgical planning. Here we discuss novel imaging techniques to help preserve spinal cord function and maximize extent of resection in the context of a selected case series.

RESIDENT: Chad Tuchek
AUTHORS: Chad Tuchek1, Roukoz Chamoun, MD1
RESIDENT AWARD: YES

TITLE: Pituitary Apoplexy: A Meta Analysis of Surgical and Medical Management Long Term Outcomes

ABSTRACT: Acute pituitary apoplexy is a relatively rare, but potentially devastating complication of pituitary tumors. Given the rarity, few studies have examined the long term endocrinologic and neuroophthalmological outcomes of pituitary apoplexy. A systematic review using PRISMA guidelines was undertaken to synthesize the outcomes of patients who underwent surgery vs medical management for pituitary apoplexy. Studies were identified by searching the PubMed database for the search terms of 'pituitary apoplexy' AND 'outcomes' in all fields which were published in the year 2000 or later. A total of 34 articles were used for analysis. In the reviewed series, visual field deficits were present in 30% - 64% of surgical managed patients as compared to 17%-55% of medically managed patients. Surgically managed patients had complete or partial resolution in 31% - 100% of patients. Medically managed patients had no patients without improvement in visual field deficits. While ophthalmologic outcomes showed a significant improvement seen in most patients, endocrinological function following pituitary apoplexy showed significant dysfunction at last follow up. At best, 44% of conservatively managed and 48% of apoplectic events resulted in normal pituitary function at follow up. Traditionally, in the presence of neuro-ophthalmologic deficits neurosurgical decompression was considered the preferred treatment. Today however, there is a growing body of literature which examines non-operative medical management of acute pituitary apoplectic event. Here we review the growing body of literature that assesses both operative and medical management of pituitary apoplexy.

RESIDENT: Jessa E. Hoffman
AUTHORS: Jessa E Hoffman; Megan V Ryan; Greenan Krista ; Charles Wilkinson
SUBMITTED: 3/11/2019
SUBJECT CATEGORY: PEDIATRICS
RESIDENT AWARD: YES

TITLE: Successful Treatment of Brainstem Cavernous Malformation with Hematoma Evacuation Followed by Propranolol

KEYWORDS: cavernous, malformation, brainstem, propranolol

STUDY DESIGN: Case Report

ABSTRACT: Brainstem cavernous malformations are benign vascular lesions that can cause devastating neurologic decline when hemorrhagic. The definitive treatment for symptomatic brainstem cavernous malformations is generally considered to be microsurgical resection; however complete resection is difficult without risking damage to neurologic structures. Case studies suggest a role for propranolol in treating cavernous malformations, including after symptomatic hemorrhage and previous resection. Here we describe a hemorrhagic brainstem cavernous malformation successfully treated with the sequence of surgical evacuation of the hematoma followed by postoperative propranolol. The cavernoma itself was not resected.

METHODS: A nearly 3-year-old male presented with altered mental status, gait disturbance, and ptosis. CT and MRI demonstrated an acute pontine hematoma along with vasogenic edema and effacement of the fourth ventricle. A large vein suggested cavernous malformation. His condition slowly declined then acutely worsened. A repeat CT demonstrated expansion of hematoma and he was taken emergently to the OR. Due to the sensitive location of the hematoma in the pons, we planned to evacuate the hematoma without resecting any of the cavernoma. Instead, we planned to treat the cavernoma with propranolol. Postoperatively, the patient's condition improved, and was still improving at hospital discharge 2 weeks later. He was treated with 2 mg/kg total daily of propranolol for 6 months beginning the day after surgery.

RESULTS: Follow up MRI showed no cavernoma with only hemosiderin at the site of the evacuated hematoma. Thirteen months postoperatively he continues to improve with only mild deficits.

CONCLUSION: This is the first reported case of a hemorrhagic brainstem cavernous malformation treated with a planned sequence of hematoma evacuation followed by propanolol without attempting to resect the cavernoma. The success of this strategy suggests it may be a viable way to minimize operative injury in patients with hemorrhagic cavernous malformations of the brainstem while still evacuating symptomatic hematomas and treating the cavernomas.

LEARNING OBJECTIVES: -Propranolol may be a viable option for treatment of cavernomas
-Hematoma evacuation without resection of the cavernoma avoids significant perioperative risk
-Further research is needed for investigation of propranolol in cavernoma treatment in the future

AUTHOR DECLARATIONS:

- Has the work presented in this abstract, or substantially similar work, been presented or published by the author(s) previously? NO
- Is the work presented in this abstract, or substantially similar work, being submitted for presentation at another meeting? NO

RESIDENT: Brandon A. Sherrod
AUTHORS: Brandon A Sherrod; Michael Karsy; Erica Bisson
SUBMITTED: 3/30/2019
SUBJECT CATEGORY: SPINE
RESIDENT AWARD: YES

TITLE: Dysphagia and Quality of Life Outcomes Following Anterior Cervical Fusion

KEYWORDS: Anterior Cervical Fusion, Dysphagia, Quality of Life, Outcomes

STUDY DESIGN: Retrospective Chart Review

ABSTRACT: Dysphagia is a known complication of anterior cervical surgery. Here were examined postoperative dysphagia and its association with quality of life outcomes.

METHODS: Patients who underwent anterior cervical discectomy and fusion (ACDF), anterior cervical corpectomy and fusion, or combined anterior/posterior instrumentation and fusion at the authors' institution from 2016 to 2018 were eligible for inclusion. Patients with three time points (pre-operative, first postoperative, second postoperative) of EAT-10 (validated dysphagia index) and EQ5D (validated quality of life index) measurements were then included for analysis.

RESULTS: Sixty-four patients were included for analysis. Mean age at surgery was 57.9 years and 53.1% of patients were female. Fifteen (23.4%) patients underwent one-level ACDF, thirty (46.9%) underwent multi-level ACDF, and nineteen (29.7%) underwent combined anterior/posterior approach. There was no significant difference in postoperative EAT-10 score for anterior only vs. combined anterior/posterior approaches ($p=0.126$). Overall, there were significant differences in the pre- vs. first post-operative EAT-10 score ($p=0.007$) but not the first postoperative vs. second postoperative EAT-10 score ($p=0.07$) or preoperative vs. second postoperative EAT-10 score ($p=0.275$). When stratified by EAT-10 score ≥ 3 and <3, there was a significant difference in EQ5D score during the preoperative visit ($p=0.019$) but not the first postoperative visit ($p=0.065$) or second postoperative visit ($p=0.455$). There was a significant difference in the preoperative EQ5D scores vs. first postoperative (0.61 ± 0.03 vs. 0.73 ± 0.02, $p=0.004$) and second postoperative (0.61 ± 0.03 vs. 0.77 ± 0.03, $p=0.0002$). In the multivariate linear regression analysis, history of prior cervical surgery ($\beta = -0.510$, $p=0.044$) and BMI at surgery ($\beta=0.572$, $p=0.013$) were associated with EQ5D score.

CONCLUSION: There was no difference in quality of life postoperative outcome for patients with dysphagia (EAT-10 ≥ 3) compared to patients without dysphagia. Quality of life was significantly improved overall at both postoperative visits vs. preoperative.

LEARNING OBJECTIVES:
1) Understand the relationship between quality of life and dysphagia related to anterior cervical fusion including how perioperative timing affects both
2) Understand the factors associated with quality of life outcome following anterior cervical fusion
3) Understand the validated scoring systems (EAT-10 and EQ5D) for measuring dysphagia and quality of life outcomes following surgery

AUTHOR DECLARATIONS:
- Has the work presented in this abstract, or substantially similar work, been presented or published by the author(s) previously? NO
- Is the work presented in this abstract, or substantially similar work, being submitted for presentation at another meeting? NO

RESIDENT: Jian Guan
SUBMITTED: 2/27/2019
SUBJECT CATEGORY: SPINE
RESIDENT AWARD: YES

TITLE: Addition of Fusion to Decompression for Grade I Degenerative Lumbar Spondylolisthesis Is Associated with Greater Patient-Reported Outcome Improvements at 24-Month Follow-up: A Multicenter Study Using the Quality Outcomes Database

AUTHORS: Erica F. Bisson, MD, MPH1; Jian Guan, MD1; Mohamad Bydon, MD2; Mohammed A. Alvi, MBBS2; Steven D. Glassman, MD3; Kevin T. Foley, MD4; Eric A. Potts, MD5; Christopher I. Shaffrey, MD6; Mark E. Shaffrey, MD7; Domagoj Coric, MD8; John J. Knightly, MD9; Paul Park, MD10; Michael Y. Wang, MD11; Kai-Ming Fu, MD, PhD12; Jonathan R. Slotkin, MD13; Anthony L. Asher, MD8; Michael S. Virk, MD, PhD12; Panagiotis Kerezoudis, MD2; Regis W. Haid, MD15; Andrew K. Chan, MD15; Praveen V. Mummaneni, MD15

Affiliations:
1. Department of Neurological Surgery, University of Utah, Salt Lake City, Utah, USA
2. Department of Neurological Surgery, Mayo Clinic, Rochester, Minnesota, USA
3. Norton Leatherman Spine Center, Louisville, Kentucky, USA
4. Department of Neurological Surgery, University of Tennessee, Semmes-Murphey Neurologic and Spine Institute, Memphis, Tennessee, USA
5. Department of Neurological Surgery, Indiana University, Goodman Campbell Brain and Spine, Indianapolis, Indiana, USA
6. Departments of Neurological and Orthopaedic Surgery, Duke University, Durham , North Carolina, USA
7. Department of Neurological Surgery, University of Virginia, Charlottesville, Virginia, USA
8. Neuroscience Institute, Carolinas Healthcare System and Carolina Neurosurgery & Spine Associates, Charlotte, North Carolina, USA
9. Atlantic Neurosurgical Specialists, Morristown, New Jersey, USA
10. Department of Neurological Surgery, University of Michigan, Ann Arbor, Michigan, USA
11. Department of Neurological Surgery, University of Miami, Miami, Florida, USA
12. Department of Neurological Surgery, Weill Cornell Medical Center, New York, New York, USA
13. Geisinger Health, Danville, Pennsylvania, USA
14. Atlanta Brain and Spine Care, Atlanta, Georgia, USA 15. Department of Neurological Surgery, University of California, San Francisco, California, USA

KEYWORDS: QOD, spondylolisthesis, outcomes

STUDY DESIGN: Retrospective chart review

ABSTRACT

Background: Extensive investigation has not ascertained the ideal surgical management of grade 1 lumbar spondylolisthesis. Using the large, multicenter, prospectively collected Quality Outcomes Database (QOD), we compared 24-month outcomes for patients undergoing decompression alone versus decompression and fusion.

Methods: Patients undergoing single-level surgery from 7/1/2014 through 6/30/2016 were identified. The primary outcome measure, 24-month Oswestry Disability Index (ODI) change, was analyzed with univariate and multivariable linear regression. EQ-5D scores, numerical rating scale (NRS) back and leg pain scores, and North American Spine Society patient satisfaction scores were also analyzed.

Results: Of the 608 patients (85.5% with at least 24-month follow-up) who met the inclusion criteria, 140 (23.0%) underwent decompression alone and 468 (77.0%) underwent decompression and fusion. The 24-month change in ODI was significantly greater in the fusion group than the decompression-only group (-25.82±20.01 vs. -15. 28±19.8, p<0.001). Fusion remained independently associated with 24-month ODI change in our multivariable model (B=-9.827.05, 95% CI -15.580.70 to -4.063.39, p=<0. 001). Patients in the fusion group were significantly more likely to reach minimal clinically important difference (MCID, 12.8 points) in ODI at 24 months (72.53.3% vs. 56.60%, p=<0.0012), and to experience significantly greater NRS back pain improvement at 24-month follow-up (-4.03.8±3.10 vs. -2.01.8±3.9, p<0.001). Fusion was also independently associated with achieving MCID for ODI at 24 months in our logistic regression model (OR 1.767, 95% CI 1.058-2.944, p=0.029).

Conclusions: The results of our study suggest that decompression plus fusion may offer superior outcomes to decompression alone in patients with grade 1 lumbar spondylolisthesis at 24 months. Longer-term follow-up is warranted to assess whether this effect is sustained.

LEARNING OBJECTIVES:

1)Identify patient reported outcome measures which change following surgical intervention for lumbar spondylolisthesis

2)Discuss the utility of large databases such as the QOD to evaluate outcomes for common neurosurgical procedures

3)Compare the outcomes of fusion and decompression in the treatment of patients with spondylolisthesis

AUTHOR DECLARATIONS:

- Has the work presented in this abstract, or substantially similar work, been presented or published by the author(s) previously?
    - YES - Presented at 2019 Lende Neurosurgical Meeting at Snowbird Utah
- Is the work presented in this abstract, or substantially similar work, being submitted for presentation at another meeting? NO
- AANS Disclosure of Financial Relationships - NO

AUTHOR: Michael Lawton, MD

TITLE: Surgical Management of Brain AVMs

ABSTRACT: Microsurgical resection is the first-line therapy or "gold standard" for many brain arteriovenous malformations because of its high cure rate, low complication rate, and immediacy. Surgical results have improved over time with: (1) the creation of grading systems to select patients likely to experience optimal outcomes; (2) the development of instruments like bipolar forceps and AVM microclips that coagulate or occlude feeding arteries effectively; (3) the recognition of AVM subtypes that help decipher AVM anatomy; and (4) the refinement of surgical approaches, strategies, and dissection techniques that facilitate safe AVM resection. A consecutive, single-surgeon experience with 850 patients is reviewed to demonstrate that these advances. This presentation will discuss: patient selection using the Lawton-Young supplementary grading system; microsurgical strategy using a system of AVM types and subtypes; surgical technique using a standardized eight-step plan; and multimodality approaches using volume-staged radiosurgery to downgrade large AVMs and convert them to operable lesions.

AUTHOR: Michael Lawton, MD

TITLE: Bypass Surgery for Complex Brain Aneurysms

ABSTRACT: Intracranial-to-intracranial (IC-IC) bypasses are alternatives to traditional extracranial-to-intracranial (EC-IC) bypasses that reanastomose parent arteries, reimplant efferent branches, revascularize branches with in situ donor arteries, and reconstruct bifurcations with interposition grafts that are entirely intracranial. These newer bypasses represent an evolution in bypass surgery from using scalp arteries and remote donor sites towards a more local and reconstructive approach. We adopted a practice that utilizes IC-IC bypass preferentially when revascularization is needed in the management of complex aneurysms. Our experience with bypass for aneurysms was reviewed. During a 21-year period in which 4600 aneurysms were treated microsurgically in 3751 patients and 660 bypasses were performed. Surgical techniques will be presented and associated outcomes were equivalent to traditional EC-IC bypasses. Adopting an IC-IC bypass approach requires experience in the operating room with simpler bypasses, confidence, and dedication to advancing the craft of bypass surgery.

RESIDENT: Robert Kim
AUTHOR LIST: Robert B Kim; Christopher G Wilkerson; Michael Karsy; Evan Joyce; John Rolston; William T Couldwell; Mark A. Mahan
SUBMITTED: 3/5/2019
SUBJECT CATEGORY: SPINE
RESIDENT AWARD: YES

TITLE: Any-cause Prolonged Length of Stay (pLOS) Is Associated With Increased Risk of Unplanned 30-day Readmission in Elective Spine Surgery Patients: Propensity Score-Matched Analysis of 33,840 patients.

KEYWORDS: prolonged length of stay, unplanned readmission, elective spine surgery

STUDY DESIGN: Retrospective chart review

ABSTRACT: Unplanned hospital re-admissions are costly for patients and insurance payors alike. Increased length of hospital stay has been cited as a risk factor for readmission in a number of studies. However, a large-scale, multi-institutional, risk-adjusted study that evaluates association between prolonged length of stay (pLOS) and unplanned readmission in elective spine patients has not been performed.

METHODS: The American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) database was retrospectively reviewed to identify all patients who underwent elective spine procedures during 2007-2015. After exclusion, patients were subdivided into pLOS group ($\geq$ 4 days) or control (0-3 days). Propensity-score matching algorithm was utilized to reduce baseline differences between the cohorts. Univariate and multivariate analyses were performed to assess the degree of association between pLOS and unplanned readmission.

RESULTS: The overall 30-day unplanned readmission rate of 33,840 elective spine patients was 5.5%. Propensity score matching yielded 16,920 well-matched pairs with mean standard difference of propensity score of 0.017. The mean LOS was 2 and 6 days for the control and pLOS group, respectively. In our univariate analysis, pLOS was associated with post-operative complications, especially medical complications (22.7% vs. 8.3%, $p<0.001$). Most wound-related complications occurred after discharge while most inpatient complications were medical in nature. Patients with medical complications were more likely to develop wound-related complications (5.1 % vs. 1.7%, $p<0.001$). In our multivariate analysis of propensity score-matched population which adjusted identified con-founders, pLOS was associated with an increased risk of 30-day unplanned readmission (OR 1.459, 95% CI 1.326-1.605), $p<0.001$).

CONCLUSION: Causes of prolonged length of stay are likely multi-factorial in nature. In select patients who undergo elective spine procedures, patients with any-cause pLOS (defined as >4 days) are at increased risk of having unplanned 30-day readmission compared to patients with shorter hospital stays.

LEARNING OBJECTIVES:

1. Understand how the population based studies can impact clinical practice.

2. Appreciate prolonged length of stay as a risk factor for unplanned readmission

3. Appreciate propensity score matching as an important tool to reduce baseline differences in retrospective studies.

AUTHOR DECLARATIONS:

- Has the work presented in this abstract, or substantially similar work, been presented or published by the author(s) previously? NO

- Is the work presented in this abstract, or substantially similar work, being submitted for presentation at another meeting? NO

RESIDENT: Clinton D. Morgan

AUTHORS: Clinton D Morgan; Michael D Bohl; Peter Nakaji; Andrew Little

SUBMITTED: 3/15/2019

SUBJECT CATEGORY: Socioeconomic

RESIDENT AWARD: YES

TITLE: The Barrow Innovation Center: A Novel Program in Neurosurgical Education

KEYWORDS: Medical education, intellectual property

STUDY DESIGN: Case Report

ABSTRACT: Revolutions in neurosurgical care have not occurred with out the challenge of existing standards of care. Innovation not only requires intellectual curiosity and topical expertise, it also is catalyzed by an education in the process of developing a new idea from sketch to prototype.

METHODS: In the last 5 years, the Barrow Innovation Center has developed formal partnerships with the Arizona State University School of Law, School of Engineering, Texas A&M School of Engineering, and local engineering contracting firms.

RESULTS: The Barrow Neurological Institute has created a novel program in neurosurgery resident education. Taking ideas from common clinical problems that neurosurgeons face every day, residents then present their novel solution to a fellow attending and resident neurosurgeons, a group of patent law clinic experts, and engineering collaborators. The Barrow Innovation Center then provides seed funds to minimize costs to access provisional patent filing and engineering costs. This formal arrangement has permitted the filing of over 25 patents, two active licensing negotiations for products developed by the Innovation Center, and numerous new projects in the pipeline. By reducing barriers to access to both intellectual property protection and engineering, the Innovation Center is giving residents the opportunity to tackle challenging problems in neurosurgery. Through administrative support, the Innovation Center is now moving into a new physical laboratory space for further development.

CONCLUSION: The Barrow Innovation Center represents a multi-disciplinary, novel program in resident education targeted to reducing barriers to access intellectual property protection, critique from neurosurgical colleagues, and engineering resources by curious trainees.

LEARNING OBJECTIVES:

1. Understand the history of the development of the Barrow Innovation Center

2. Understand the value of intellectual property protection as an incentive for resident-driven innovation in a neurosurgical education program

3. Appreciate the pathway taken in an "privademic" medical center for a new resident idea taken from sketch to start-up company formation

AUTHOR DECLARATIONS:

- Has the work presented in this abstract, or substantially similar work, been presented or published by the author(s) previously? NO

- Is the work presented in this abstract, or substantially similar work, being submitted for presentation at another meeting? NO

RESIDENT: Joshua S. Catapano
AUTHORS: Joshua S Catapano; Nicolas Rubel; Lawton Michael; Joseph Zabrasmki
SUBMITTED: 3/12/2019
SUBJECT CATEGORY: Cerebrovascular
RESIDENT AWARD: YES

TITLE: Results of a standardized ventriculostomy protocol without an occlusive dressing in patients with aneurysmal subarachnoid hemorrhage

KEYWORDS: EVD, Subarachnoid hemorrhage, CSF infection

STUDY DESIGN: Retrospective chart review

ABSTRACT: Catheter-related infections are a potentially life-threatening complication of having an external ventricular drain (EVD). Patients with aneurysmal subarachnoid hemorrhage (aSAH) are at increased risk of infection associated with prolonged ventricular drainage, with a reported mean infection rate of 6%. We report the EVD-associated infection rate among patients with aSAH managed with a unique standardized treatment protocol without an occlusive EVD dressing.

METHODS: Patients with aSAH admitted from August 2015 through August 2017 were retrospectively analyzed for EVD placement. Cerebrospinal fluid (CSF) samples were obtained twice weekly for culture and routine studies. EVD-associated infection was defined as growth of CSF cultures.

RESULTS: During the 2-year study period, 122 patients presented with an aSAH, with 91 (74.6%) having EVD placement. In patients with EVDs, the mean age was 57.9 years (68% female); 88% of aSAHs were Fischer grade III-IV. Mean duration of EVD was 14 days, and 13% of patients required EVD replacement. Endovascular coiling and surgical clipping were performed in 34 (37%) and 53 (58%) patients with EVD, respectively. A total of 347 CSF studies were performed with no EVD-associated infections. There were 3 CSF Gram stains with false-positive gram stains, but no growth on concurrent or multiple repeat cultures.

CONCLUSION: Using a standardized protocol for placement and management of EVDs in patients with aSAH is associated with low risk of CSF infection. Our study demonstrates that occlusive EVD dressings are not necessary and that routine CSF sampling in patients with EVD may lead to false-positive findings and unnecessary antibiotic administration.

LEARNING OBJECTIVES:

1. Proper EVD placement and management

2. Low risk of EVD infection with a standardized protocol

3. Lack t of occlusive dressing allows for decrease risk of infection and easier EVD site care.

AUTHOR DECLARATIONS:

- Has the work presented in this abstract, or substantially similar work, been presented or published by the author(s) previously? No

- Is the work presented in this abstract, or substantially similar work, being submitted for presentation at another meeting? No

RESIDENT: Vin Shen Ban
AUTHORS: Vin Shen Ban; Salah G. Aoun; Jeffrey Beecher; Tarek Y. El Ahmadieh; Awais Vance; Om J Neeley; Cameron M McDougall; Joan Reisch; Babu Welch; Hunt H. Batjer; Duke S Samson; Jonathan A. White
SUBMITTED:
SUBJECT CATEGORY: Cerebrovascular
RESIDENT AWARD: YES

TITLE: The Southwestern Aneurysm Severity Index for Unruptured Aneurysms

KEYWORDS: aneurysm, microsurgery, clipping, outcomes

STUDY DESIGN: Retrospective Review

ABSTRACT: The Southwestern Aneurysm Severity Index (SASI) has recently been studied as an outcome prediction tool for ruptured aneurysms treated microsurgically. We now assess its relevant components with the aim of building a tailored prediction model for unruptured intracranial aneurysms treated microsurgically.

METHODS: Patients presenting to our institution with unruptured aneurysms from 1996-2015 treated with microsurgery were included. Outcome was defined as GOS at discharge (GOSd) dichotomized to 1-3 vs 4-5. The SASI was composed of multiple prospectively recorded patient demographic, clinical, radiographic and aneurysm specific variables. Univariate and multivariate analyses were used to construct the best predictive models for patient outcome. In constructing a modified SASI scoring system, the cohort was randomly split, with one half acting as the derivation sample and the other as the validation sample.

RESULTS: We identified 1,708 eligible patients. The GOSd was 1-3 in 294 patients (17.2%) and 4-5 in 1414 patients (82.8%). Univariate chi-square analyses revealed age ($p<0.001$), sex ($p<0.001$), Non-Neurological ASA score (NNASA, $p<0.001$), aneurysm location ($p<0.001$), multiple aneurysms with the intent to treat ($p<0.001$), calcification/thrombosis ($p<0.001$), size>20mm ($p<0.001$), and intraoperative rupture ($p=0.01$) to be associated with unfavorable GOS.

In a multivariate stepwise logistic regression, the best predictive model for poor outcome included size>20mm ($p<0.001$), aneurysm location ($p<0.001$), age ($p<0.001$), NNASA ($p=0.001$), intraoperative rupture ($p=0.01$), and calcification/thrombosis ($p=0.01$).

CONCLUSION: Patient clinical, radiographical, and aneurysmal characteristics were identified as being predictive of GOS at discharge. A modified version of the SASI scoring system for unruptured aneurysms treated microsurgically will be presented at the meeting.

LEARNING OBJECTIVES:
1. Identify factors that influence outcomes after surgery for unruptured aneurysms.
2. Discuss the relative contributions of these factors towards outcomes.
3. Utilize the SASI scale to predict outcomes in unruptured aneurysms undergoing clipping.

AUTHOR DECLARATIONS:
- Has the work presented in this abstract, or substantially similar work, been presented or published by the author(s) previously?
  - YES - Previously presented at the AANS meeting
- Is the work presented in this abstract, or substantially similar work, being submitted for presentation at another meeting? NO

RESIDENT: Steven R Ottersberg
SUBMITTED: 3/9/2019
SUBJECT CATEGORY: HISTORY
RESIDENT AWARD: YES

TITLE: Pharmacology and Pharmacogenomics of Cannabis Therapies

KEYWORDS: Cannabis, THC, CBD, dosing, genetics

STUDY DESIGN: Survey

ABSTRACT: The purpose of this talk is to provide an introduction to the receptors, enzymes and transporters of the endocannabinoid system (ECS). A functional understanding of the ECS is essential to understand the variability in response in cannabis therapies. Polymorphisms in the genes that encode for the components of the ECS can be predictors of potential benefit or adverse events in the administration of cannabis therapies. The fundamental pharmacology of cannabinoid and terpenoids is essential to understand the response in individual patients.

METHODS: Literature review

RESULTS: The information presented in this talk is intended to provide the neurologist a functional understanding of what they may expect to observe in patients that self administer cannabis containing products. It is assumed that the attendees do not recommend cannabis products but often see patients that are consuming cannabis containing products. This talk is intended to give a physiological understanding of the endocannabinoid system, cannabis therapeutics and the genes that influence cannabis response.

CONCLUSION: With legalization in multiple states the number of patients self medicating with cannabis is growing. Medical professionals do not learn about the endocannabinoid system in medical school and therefore do not have a working understanding of the roles of phytocannabinoid therapies.

LEARNING OBJECTIVES: Introduction to the endocannabinoid system, pharmacology of major cannabinoids and terpenoids, and genetic influences on cannabis response.

AUTHOR DECLARATIONS:
- Has the work presented in this abstract, or substantially similar work, been presented or published by the author(s) previously?
  - YES - This work has been presented at multiple medical conferences.
- Is the work presented in this abstract, or substantially similar work, being submitted for presentation at another meeting?
  - YES - This presentation will be presented at Low Carb USA, Ancestral Health Symposium and American Association of Naturopathic Physicians.
- AANS Disclosure of Financial Relationships - NO

RESIDENT: Douglas Orndorff
AUTHORS: Anneliese D Heiner; Jim A Youssef; Douglas G Orndorff
SUBMITTED: 3/15/2019
SUBJECT CATEGORY: SPINE
RESIDENT AWARD: NO

TITLE: Lateral Lumbar Interbody Fusion As A Treatment For Adult Degenerative Scoliosis: Survival Analysis

KEYWORDS: Adult degenerative scoliosis, lateral lumbar interbody fusion, reoperation, survival analysis

STUDY DESIGN: Retrospective chart review

ABSTRACT: Indications for lateral lumbar interbody fusion (LLIF), a minimally invasive spinal surgery technique, have expanded to include adult degenerative scoliosis. The purpose of this study was to estimate survival after LLIF with supplemental posterior decompression and instrumentation as a treatment for adult degenerative scoliosis.

METHODS: Chart data were retrospectively reviewed for patients who underwent LLIF with supplemental posterior decompression and instrumentation for adult degenerative scoliosis and were not lost to follow-up at less than two years' postoperatively. Demographic and operative data were collected, as were dates of surgery, reoperation, and latest follow-up, and the reoperation reason. Kaplan-Meier survival estimations were calculated.

RESULTS: Sixty-one surgeries were performed—9 with one-level LLIF, 23 with two-level LLIF, 26 with three-level LLIF, and 3 with four-level LLIF. Average age at surgery was 67.7 years (standard deviation 8.2 years), and 36 (59.0%) of the surgeries were performed on female patients. Average follow-up time was 3.35 years (range 9 days–12.2 years). Twenty-two (36.1%) patients were reoperated. Twelve (19.7%) patients were reoperated for adjacent segment disease, two (3.3%) for herniated disc, two (3.3%) for stenosis plus synovial cyst, and one (1.6%) each for visceral injury, infection, hardware loosening, stenosis, pseudoarthrosis, and failed back syndrome with radiculopathy and pseudoarthrosis of a level that had been reoperated during the index LLIF surgery. The Kaplan-Meier survival estimates for avoiding any reoperation were 86.9% at one year, 77.0% at two years, 57.3% at five years, and 45.8% at eight to twelve years. The Kaplan-Meier survival estimates for avoiding reoperation for adjacent segment disease were 98.3% at one year, 88.3% at two years, 75.3% at five years, and 60.2% at eight to twelve years.

CONCLUSION: These results indicate that lateral lumbar interbody fusion plus supplemental posterior decompression and instrumentation is a valid treatment option for adult degenerative scoliosis.

LEARNING OBJECTIVES:
1) Indications for lateral lumbar interbody fusion have expanded to include adult degenerative scoliosis.
2) Survival for avoiding reoperation for adjacent segment disease after lateral lumbar interbody fusion plus supplemental posterior decompression and instrumentation is estimated as 75.3% at five years.
3) Lateral lumbar interbody fusion plus supplemental posterior decompression and instrumentation is a valid treatment option for adult degenerative scoliosis.

AUTHOR DECLARATIONS:
- Has the work presented in this abstract, or substantially similar work, been presented or published by the author(s) previously? NO

- Is the work presented in this abstract, or substantially similar work, being submitted for presentation at another meeting? YES - NASS 2019

RESIDENT: Douglas G Orndorff
AUTHORS: Douglas G Orndorff; Jim A Youssef; Anneliese D Heiner
SUBMITTED: 3/15/2019
SUBJECT CATEGORY: SPINE
RESIDENT AWARD: NO

TITLE: Efficacy of Demineralized Bone Matrix For Instrumented Combined Posterolateral Interbody Lumbar Fusion

KEYWORDS: Demineralized bone matrix, patient-reported outcome measures, posterolateral lumbar fusion, transforaminal lumbar interbody fusion

STUDY DESIGN: Prospective Controlled Trial

ABSTRACT: Demineralized bone matrix (DBM) products, with their osteoconductive and osteoinductive properties, have become popular for use in spinal fusion procedures. The purpose of this study was to prospectively evaluate the performance of a demineralized bone matrix (DBM; Accell Evo3, IsoTis OrthoBiologics, Inc., Irvine, CA) as an adjunct to instrumented combined posterolateral interbody lumbar fusion.

METHODS: Twenty-nine patients underwent transforaminal lumbar interbody fusion (TLIF) along with pedicle screw instrumentation and posterolateral lumbar fusion (PLF) at L4-L5, L5-S1, or both. The TLIF procedure included interbody spacers of the surgeon's choice plus DBM placed within the interbody cage (off-label and off-protocol use) and local autograft placed behind the cage within the disc space. The PLF procedure included DBM combined with local autograft. Fusion was assessed by plain film X-ray and by computerized tomography when available. Oswestry Disability Index (ODI) and visual analog scale for pain in the back (VAS-back) were collected preoperatively and at 6, 12, and 24 months postoperatively. Complications were recorded. Data were compared with a retrospective cohort of thirty patients treated with recombinant human bone morphogenetic protein-2 (BMP-2; Infuse, Medtronic, Fridley, MN; off-label use for both TLIF and PLF) and local autograft.

RESULTS: The interbody and posterolateral fusion rates per level and per patient were similar in both groups, as were the improvements in ODI and VAS-back. One BMP-2 subject experienced neuritis, possibly secondary to the use of rhBMP-2; no graft-related complications occurred in the DBM group. One patient in the DBM group was reoperated at the index level for pseudoarthrosis.CONCLUSION: This first human prospective study on the performance of Accell Evo3 DBM in instrumented combined posterolateral interbody lumbar fusion suggests that this DBM may be a valid alternative to other bone graft adjuncts or biologics on the market.

LEARNING OBJECTIVES:

1) Demineralized bone matrix products, with their osteoconductive and osteoinductive properties, have become popular for use in spinal fusion procedures.

2) The demineralized bone matrix and the bone morphogenetic protein evaluated in this study, combined with local autograft, had similar radiographic and clinical performance in instrumented combined posterolateral interbody lumbar fusion.

3) The demineralized bone matrix product evaluated in this study may be a valid alternative to other bone graft adjuncts or biologics on the market.

AUTHOR DECLARATIONS:

o Has the work presented in this abstract, or substantially similar work, been presented or published by the author(s) previously? Yes - LSRS 2018

• Is the work presented in this abstract, or substantially similar work, being submitted for presentation at another meeting? Yes - NASS 2019

RESIDENT: Bradley Lega

SUBMITTED: 2/19/2019

SUBJECT CATEGORY: History

RESIDENT AWARD: NO

TITLE: Theodore Billroth and the origins of modern surgical practice

KEYWORDS: aseptic technique, Billroth, Lister, Virchow

STUDY DESIGN: Survey

ABSTRACT: Theodore Billorth was a leading 19th century surgeon at the famed Vienna school. His practice illustrates the intersection of new ideas regarding sterile technique and the struggles that contemporary surgeons had with this revolutionary idea. The goals of this lecture are to demonstrate how skilled, thoughtful surgeons dealt with an idea that was revolutionizing the practice of surgery. His influence is especially pertinent to our profession (neurosurgery) as William Halsted toured through the Vienna school in 1878 just when these ideas were being implemented. Further, Billroth's notions of surgical education, data collection, and his experience in the Franco-Prussian War had lasting influence on Halsted and other surgeons. The renowned educational system from which Harvey Cushing benefitted promulgated by Billroth and then Halsted directly fostered the establishment of neurosurgery as a respected discipline with its intellectual home in North America.

METHODS: Discussion of primary and secondary texts.

RESULTS: See above

CONCLUSION: A study of Theodore Billroth is instructive for practicing neurosurgeons to understand how previous generations dealt with technological revolutions that remade their profession, as well as the principles of surgical education that led to the establishment of the norms that govern training in our own profession.

LEARNING OBJECTIVES:

1. Describe the contributions of Billroth to adoption of aseptic technique

2. Describe the influence of Billroth on principles of surgical education

3. Describe the influence of Billroth on academic surgical practice including data collection for M&M conferences.

AUTHOR DECLARATIONS:

- Has the work presented in this abstract, or substantially similar work, been presented or published by the author(s) previously? NO

- Is the work presented in this abstract, or substantially similar work, being submitted for presentation at another meeting? NO

- AANS Disclosure of Financial Relationships - NO

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